U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

15.0 INTRODUCTION

The review branches in the Division of Systems Integration and the Division of Engineering that have some responsibility for review of anticipated operational occurrences and postulated accidents listed in this chapter are as follows:

Reactor Systems Branch (RSB) - reviews analyses of anticipated operational occurrences and postulated accidents from the viewpoint of systems operation, transient dynamics, analytical methodology and meeting defined acceptance criteria.

Core Performance Branch (CPB) - reviews analyses of core physics, fuel behavior core thermal-hydraulic performance, and performs generic reviews of thermal-hydraulic computer codes and topical reports.

Effluent Treatment Systems Branch (ETSB) - reviews analyses of postulated spills of radioactive material outside containment.

Accident Evaluation Branch (AEB) - evaluates possible radiological consequences of the transients and accidents.

Instrumentation and Controls Systems Branch (ICSB) - reviews and evaluates the reactor protection and safety instrumentation and control instrumentation.

Power Systems Branch (PSB) - reviews and evaluates emergency onsite power.

Auxiliary Systems Branch (ASB) - evaluates the operation and performance of the auxiliary systems following anticipated operational occurrences and postulated accidents (i.e., auxiliary feedwater systems).

Mechanical Engineering Branch (MEB) - evaluates the mechanical design of the reactor primary system and components, pipe restraints and other safety-related mechanical components and classification of structures, components and systems.

The Equipment Qualification Branch (EQB) - reviews the operability of reactor primary system components.

Containment Systems Branch (CSB) - evaluates the response of the containment to postulated accidents.

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Events such as fires, floods, storms, or earthquakes are not explicitly considered in the review of anticipated operational occurrences and postulated accidents in Chapter 15. Rather, the requirements to design for these events are reviewed under other SRP sections, as listed in Table 15-1 (attached).

The reviewers are responsible for the selection and emphasis of aspects of the reviews of anticipated operational occurrences and postulated accidents in this chapter. Judgment on the areas to be given attention during each review is based on an inspection of the information provided, the similarity of this material to that recently reviewed on other plants, and whether items of special or unique safety significance are involved.

The Reactor Systems Branch reviews the majority of anticipated operational occurrences and postulated accidents as indicated in the SRP sections for Chapter 15. Various anticipated process disturbances, equipment malfunctions, potential operator actions or errors, and component failures are examined to evaluate the plant capability to control or accommodate such failures and malfunctions. The RSB review includes an analysis of the pressure to which the reactor and steam systems are subjected and the need for engineered safety features to mitigate the consequences. The impact of various single failures on the course of anticipated operational occurrences and postulated accidents is also considered.

The transient and accident sequences are reviewed to identify necessary operator actions and to confirm that actions prescribed by procedures developed under Action Plan Item I.C.1 have been appropriately accounted for.

The Procedures and Test Review Branch, upon request, will assist the RSB reviewer in identifying all prescribed operator actions.

As required by Item II.K.3.44 of NUREG-0737, BWR applicants must demonstrate that for anticipated transients combined with the worst single failure and assuming proper operator actions, the core remains covered or provide analysis to show that no significant fuel damage results from core uncovery. Transients which result in a stuck-open relief valve should be included in this category. This may be demonstrated by plant-specifit analyses or reference to applicable generic analyses. Generic analyses are considered applicable if geometry and input conditions used for the analyses are representative or bounding.

The Core Performance Branch is responsible for the review of all reactor physics data presented in this chapter. This includes power levels, power distributions, doppler coefficients, moderator temperature coefficients, void coefficients, reactor kinetics parameters, and control rod worths. The CPB review includes the evaluation of possible damage to the fuel as well as the operating and uncertainty bands associated with these variables and assists RSB as requested.

The review of anticipated operational occurrences and postulated accidents by RSB and CPB requires an evaluation of results, presented in the application, of analytical methods which frequently are not documented in the application. In such cases, the applicant may refer to a vendor topical report. The methods include DNB (departure from nucleate boiling) correlation development, subchannel analysis, system transient analysis, analysis of RIA (reactivity-initiated accidents), and LOCA (loss-of-coolant accident) analysis. For those cases where applicants use techniques previously considered and approved by the staff, additional review of methods may not be required. However, if new

methods are involved, RSB and CPB perform a review of topical reports and other information which describe the method of analysis. Such a review generally includes vendor model description, data correlations and empirical relationships, solution techniques, summary of computer codes if involved, sample problems, experimental verification, and comparative calculations.

In its review of anticipated operational occurrences and postulated accidents, RSB and CPB may perform an independent check of the results submitted by the applicant. In such cases, RSB or CPB obtains input data for use in the audit analysis which is obtained from the applicant.

Upon request of RSB, the Instrumentation and Control Systems Branch provides assistance in evaluating the sequence of postulated events, protective and safeguards systems actuation and potential bypass modes, and manual control. ICSB determines whether reactor protection and safeguards control and instrumentation will function as assumed in the transient analysis with regard to manual or automatic actuation; remote sensing, indication, and control; and interlocks with auxiliary or shared systems. PSB determines the adequacy of onsite emergency power systems.

The AEB review is concentrated on those more severe accidents that could result in the release of radioactive materials and could have significant radiological consequences involving the general public. AEB determines the potential doses resulting from the accidents and compares these doses to established dose criteria and guidelines. Based on the results of these analyses, AEB determines the adequacy of equipment designed to mitigate radiological consequences. In addition, radiological analyses are made to determine certain technical specification limits for safety-related equipment and structures.

The ASB provides an evaluation of the auxiliary systems to confirm that these systems can supply all the functions required to support ECCS during and following a Design Basic Accident (DBA), LOCA or any other primary system pipe break.

CSB evaluates the functional capability of the containment and subcompartments for the spectrum of loss-of-coolant events under SRP Section 6.2.1. CSB, on request from the RSB, also provides an evaluation of containment pressure calculations utilized in the reflood portion of the ECCS performance analyses.

MEB is responsible for the review of the effects of blowdown loads on core support structures and on control rod guide structures. MEB verifies that the core remains in place in case of a LOCA and that the control rods can be inserted. MEB is also responsible for evaluating the effects of blowdown loads including jet forces on the piping of the reactor coolant system and on the support structures of the components of the reactor coolant system. MEB verifies that acceptable criteria have been employed in the design of the reactor coolant system and its supports to prevent failures in the reactor coolant pressure boundary or in engineered safety feature equipment in the event of a LOCA.

TABLE 15-1

Postulated Event	SRP Section		Branches Having Primary Review Responsibility
Accidents at Nearby Locations	2.2.3	Evaluation of Potential Accidents	Siting Analysis Branch
Storms	2.3	Meteorology	Accident Evaluation Branch
	3.3	Wind and Tornado Loadings	Structural Engineering Branch
Floods	2.4	Hydrologic Engineering	Hydrologic and Geotechnical Engineering Branch
	3.4	Water Level (Flood) Design	Auxiliary Systems Branch and Structural Engineering Branch
Earthquakes	2.5	Geology and Seismology	Geosciences Branch and Hydrologic and Geotechnical Branch
	3.2	Classification of Structures, Components and Systems	Mechanical Enginnering Branch
	3.7	Seismic Design of Structures	Structural Engineering Branch
	3.8	Design of Category I Structures	Structural Engineering Branch
	3.9.2	Dynamic Testing and Analysis of Mechanical Systems and Components	Mechanical Engineering Branch
	3.9.3	ASME Code Class 1, 2, and 3 components supports and core support structures	Mechanical Engineering Branch
	3.10	Seismic and Dynamic Qualifications of Mechanical and Electrical Equipment important to safety	Equipment Qualification Branch
Missiles	3.5	Missile Protection	Auxiliary Systems Branch Structural Engineering Branch Materials Engineering Branch
Fires	9.5.1	Fire Protection System	Chemical Engineering Branch